Graduate School Event

Thesis Defense: Reciprocity and inequality in social dilemmas

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Cooperation, that is, one person paying a cost for another's benefit, is a fundamental principle without which no form of society could exist. The extent to which humans cooperate with each other is also an essential feature that differentiates them from other animals. Cooperation occurs even in the absence of altruistic motivations, when it is selfishly incentivised by the expectation of a future reward. For example, many economic interactions are well described that way. This kind of cooperation requires that people exhibit reciprocal behaviour that acts as a mechanism that rewards cooperation.With game-theoretic models, it is possible to formally study potential such mechanisms and under what conditions they can exist. This thesis contributes to this effort by analysing recently introduced models of cooperation that advance on previous work by taking into account the potential for pre-existing inequality among cooperating individuals as well as the different forms that reciprocity can take.Individuals may differ both intrinsically, in their abilities, as well as extrinsically, in the amount of resources they have available. Allowing for such differences in a model of cooperation helps to understand how inequality affects the potential for, and outcomes of, cooperation among unequals. In this thesis, it is shown that in the presence of intrinsic inequality, a similar unequal distribution of resources can increase the potential for cooperation. This effect is stronger the smaller the group is in which cooperation takes place. It is also shown that under particular assumptions, if the unequal members of a group vary the size of their contributions to a cooperative effort over time, they can thereby increase their efficiency and improve the collective outcome.Cooperative behaviour in a two-person interaction can be rewarded either by direct reciprocation whenever the same two people interact again, or indirectly by a third party who observed the interaction. In the latter case of indirect reciprocity, individuals are proximally rewarded by a good reputation, which ultimately translates to being rewarded with cooperative behaviour by others. This mechanism can enable selfishly motivated cooperation even in circumstances where individuals are unlikely to meet again, akin to how money facilitates trade. While these two forms of reciprocity have mostly been studied in isolation, this thesis analyses both direct and indirect reciprocity in a general model in order to compare their relative effectiveness under different circumstances. The contribution of this thesis is an extension of previous work regarding a specific kind of interaction, whose parameters allow for convenient mathematical analysis, to the most general set of possible interactions.

Tuesday, June 10, 2025 03:00pm - 04:00pm

Sunstone Bldg / Ground floor / Big Seminar Room A (I23.EG.102) and Zoom

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